

## CLAIMS

- 1    1. A lift truck, load stabilization system for controlling the tilt angle of a lifting mast  
2       having a cargo support mounted to the mast and a tilt actuator for adjusting the mast  
3       tilt angle relative to the lift truck frame, the system comprising:
  - 4           a. an acceleration sensor mounted to the lift truck for sensing the angular  
5               direction of a resultant of the forces of gravitational acceleration and vehicle  
6               travel acceleration; and
  - 7           b. a negative feedback control system having
    - 8               i. a feedback element input connected to the acceleration sensor for  
9               feedback of said resultant angular direction,
    - 10              ii. a reference input storage for storing a value of angular direction  
11              representing the resultant angular direction of acceleration when the  
12              lift truck is at rest and the cargo support is horizontal; and
    - 13              iii. an output connected to control said actuator for controllably varying  
14              the mast tilt angle and bringing the resultant angular direction into  
15              alignment with the stored reference angular direction .
- 1    2. A lift truck system in accordance with claim 1 wherein the tilt actuator includes at least  
2       one double acting hydraulic cylinder actuator hydraulically connected to a bidirectional,

3 proportional, hydraulic valve for controlling the hydraulic fluid flow to the tilt actuator,  
4 the hydraulic valve having a control input linked to the output of the negative feedback  
5 control system for controlling the actuator to tilt the mast to a tilt angle within a smoothly  
6 continuous tilt angle range.

1 3. A lift truck system in accordance with claim 2 wherein the control system comprises  
2 an analog proportional controller.

1 4. A lift truck system in accordance with claim 2 wherein the control system comprises  
2 is a PID controller.

1 5. A lift truck system in accordance with claim 2 wherein the hydraulic valve is  
2 electrically actuated.

1 6. A method for adjusting the tilt angle of the load supporting surface of a lift truck,  
2 the method comprising: adjusting the tilt angle of the load supporting surface during lift  
3 truck operation to maintain the load supporting surface substantially perpendicular to the  
4 angular direction of the resultant of gravitational and travel acceleration.

- 1    7. A method for adjusting the tilt angle of the load supporting surface of a lift truck, the  
2       method comprising:
- 3       a. storing the angular direction of gravitational acceleration upon the load  
4           supporting surface when the lift truck is at rest and the load supporting surface  
5           is substantially horizontal;
- 6       b. sensing the resultant angular direction of gravitational and travel acceleration  
7           during lift truck operation; and
- 8       c. tilting the load supporting surface through the angular difference of said  
9           angular directions to align the load supporting surface substantially  
10          perpendicular to the resultant angular direction.
- 1    8. A method in accordance with claim 7 wherein the storing step is performed by  
2       positioning the lift truck at rest with the load supporting surface substantially horizontal  
3       and storing a sensed angular direction of gravitational force.